Chapter 6

General Results of the Cerro Grande Fire Assessment Project

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As of August 1, 2002, almost 500 sites, both ancient and historic, have been assessed for fire and non-fire related impacts. Table 6.1 provides a summary of all of the sites assessed as part of the CGFA Project. This table does not include the 12 historic buildings discussed in Chapter 11 by McGehee et al. Table 6.2 summarizes the damage to all of the sites in the burn area; the numbers in the table are greater than 500 (n = 566) because some of the sites in the study have multiple kinds of damage (i.e., some sites have both fire damage and threats from erosion and others are threatened by erosion, and have damage from suppression activities).

Ten percent of the sites in the CGFA Project survey were previously unrecorded; some of the new sites were located in previously unsurveyed areas; while others became visible when the fire burned off duff and dense vegetation that had previously obscured the site. Not all of the sites visited by assessment teams had fire damage even though they were located within the existing geographic information system (GIS) maps of the burn area (see Figure 4.2); the discrepancy is largely due to the natural movement of fire across the landscape. One hundred and forty sites, or approximately 35% of all of the assessed sites, fall into this category; most of these sites are located in areas that were impacted by a low burn according to fire intensity maps (Table 6.3). In reality, these 140 sites were located in unburned areas as assessed by field crews.

Of course many sites did not escape unscathed, as documented in Table 6.2 and in subsequent chapters, and fire impacts to sites were quite varied. The degree of impact and the kinds of damage a site sustained were affected by site type, location, and the kind of vegetation present within a given area. Historic wooden structures and other sites that had had intact architectural wood before the fire suffered a great deal of damage, while other kinds of sites located in the most severely burned areas managed to survive unscathed. Unfortunately, in several cases, fire impacts at some sites will continue for the next several years, in the form of erosion and the mixing of surface and subsurface deposits resulting from the collapse of burned trees and snags. Fortunately, some of these impacts will be mitigated naturally as duff replacement begins, and purposefully as rehabilitation efforts aid in site protection. This chapter presents a summary of the results from the analysis of the fire impacts recorded during the CGFA Project; more detailed information on specific sites is provided in Chapters 7 through 10 and on site forms included in Volume II of this report.

Table 6.1. All Assessed Sites.

Cultural Resource	Total Number Assessed
Prehistoric and temporally unplaced site	390
Historic site	68
Historic building	12
Not a site	5
Not relocated	5
Total	480

Table 6.2. Fire and Non-Fire Related Impacts to Cultural Resources Located within the Burn Area.

Impact	Prehistoric and Temporally Unplaced Sites	Historic Sites	Historic Buildings	Total
Fire damage	216	53	12	281
Suppression activities	32	3	0	35
Rehabilitation	21	8	0	29
Erosion	175	36	0	211
Total	444	100	12	556

Table 6.3. Burn Severity Based on GIS Coverage Cross-Tabulated with Burn Severity Assessment of CRMT.

Burn Severity as assessed by CRMT	Burn Severity based on GIS Coverage				Total Number of Sites
	None	Low	Moderate	Severe	
None	96	94	2	0	192
Low	20	87	6	0	113
Moderate	9	86	7	0	102
Severe	1	44	7	11	63
Total	126	311	22	11	470

A SUMMARY OF FIRE EFFECTS TO ALL ANCIENT CULTURAL RESOURCES AT LANL

The most severely impacted ancient archaeological sites (wooden historical sites were by far the most devastated by the Cerro Grande Fire, impacts to these sites are discussed in detail in Chapters 11 and 12), as a class, are masonry structures, including pueblos, fieldhouses, and an assortment of other structures that fall under the rubric “rock feature” (e.g., check dams, rock piles, garden plots, etc.). Figure 6.1 illustrates that all types of masonry structure sites were affected in a similar manner; although, pueblos were slightly less likely to be impacted by any given effect. Most pueblos are located in the piñon-juniper zone, or in the ecotone between the piñon-juniper woodland and the ponderosa pine forest: that is, pueblos are for the most part surrounded by a smaller fuel load than other sites (Vierra and Balice 2001). Damage to masonry structures at sites is quite varied.

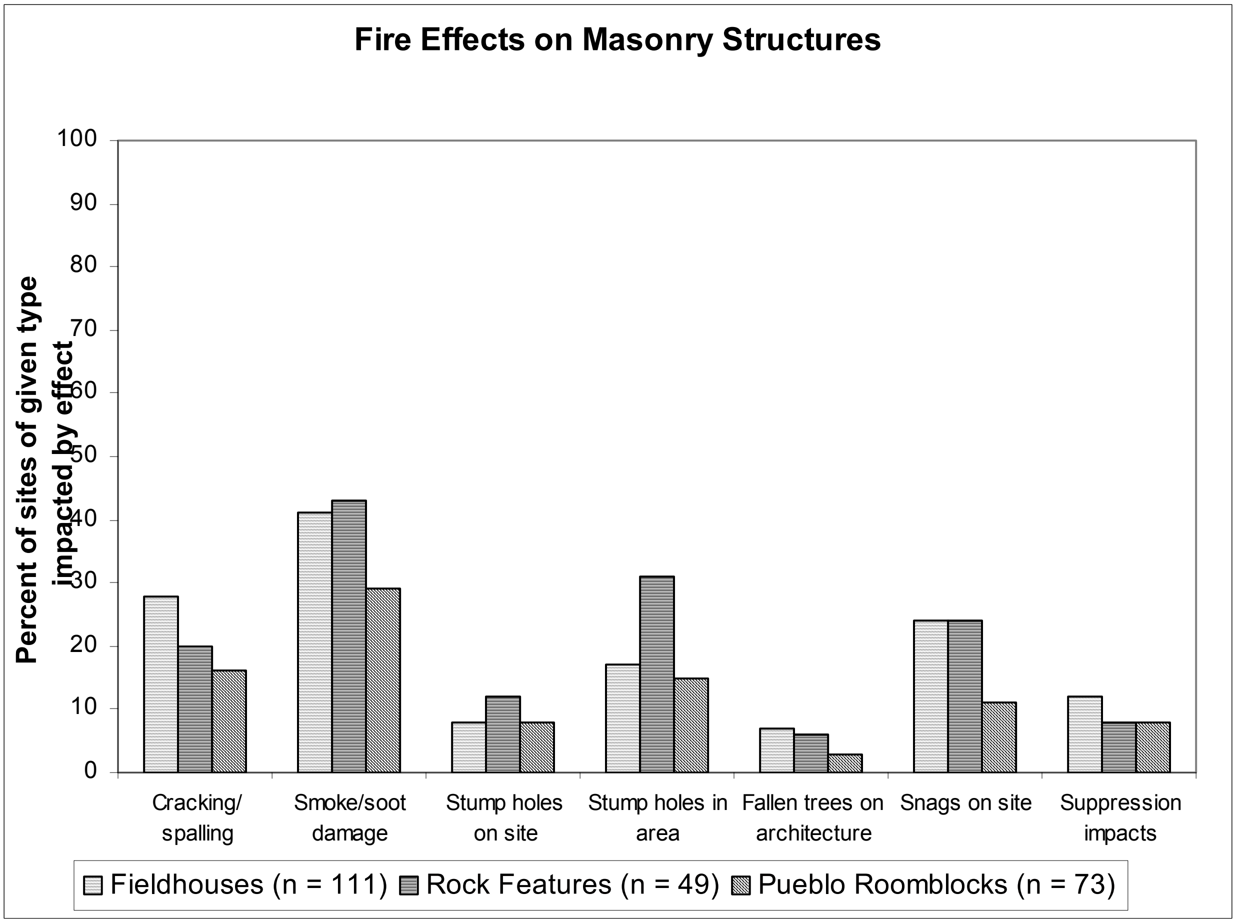

Figure 6.1. The effects of the Cerro Grande Fire on masonry structures at LANL.

Smoke or soot damage is the most common effect, but even this is present at less than 50% of the sites. Less common, but in fact more destructive, was the presence of cracking and spalling on masonry. When cracking and spalling did occur, usually less then a quarter of the masonry was affected, although in a few instances, virtually all of the masonry was spalled. Stump holes were particularly common in ponderosa pine areas that were subject to moderate- and severe-intensity burning. The presence of fallen trees on architecture was not common, however, snags do pose potential future threats to sites because they are fuel for future fires and because if they do fall, they create new avenues for erosion.

Impacts to sites from suppression of the fire ranged from relatively innocuous (i.e., vehicle ruts) to very destructive; in some cases masonry blocks from fieldhouses were used to anchor tents in the suppression camp. Three fieldhouses were almost completely destroyed by dozer lines. Fortunately, these highly adverse impacts were very rare, and less than six sites were affected.

Fire damage to cavates (Figure 6.2) was infrequent and minor, and, in general, these features weathered the Cerro Grande Fire quite well. There is, however, one significant potential research issue created by the fire. The interiors of many cavates were deliberately smoke-blackened as part of their original construction. These carbon deposits have the, albeit untested, potential to yield radiocarbon dates. It is not known if soot from the Cerro Grande Fire caused contamination problems for radiocarbon dating.

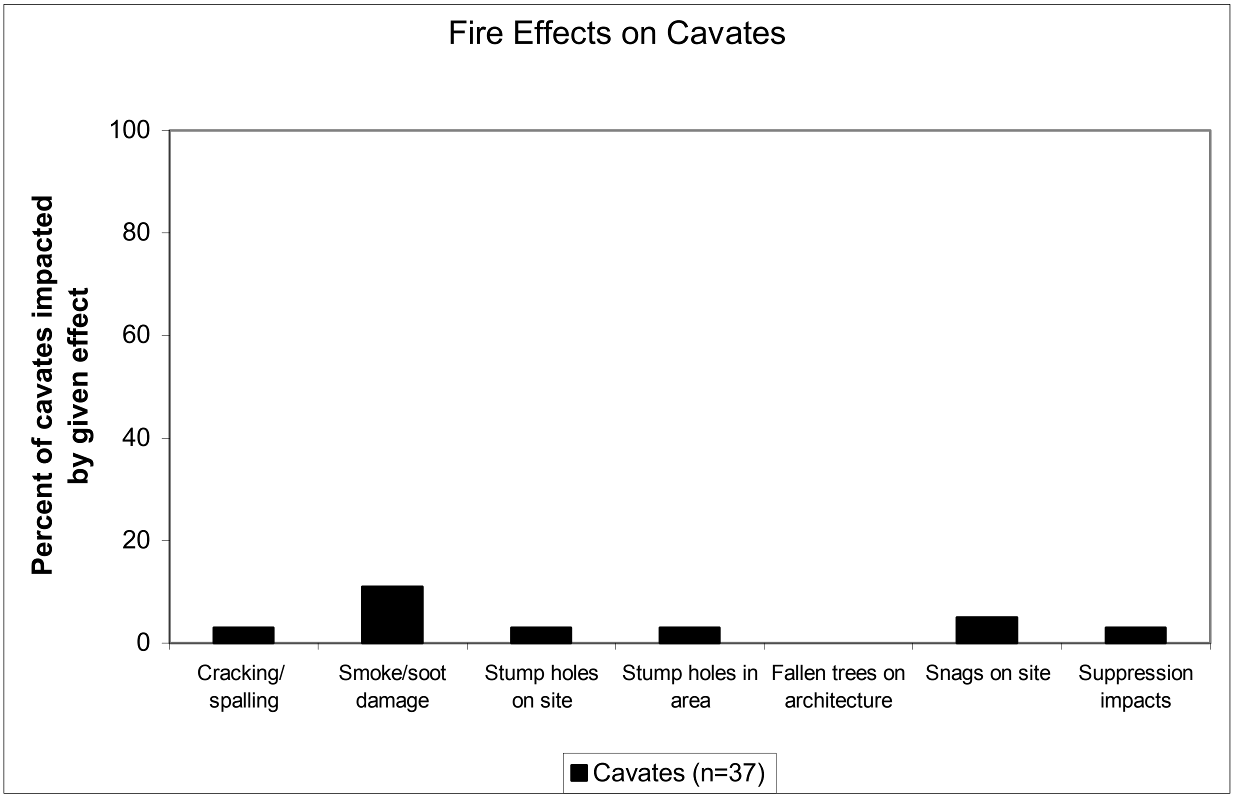

Figure 6.2. Fire effects on cavate features at LANL.

Artifact scatters were impacted in ways that differ from sites with masonry architecture. The main impact to artifact scatters is from erosion and the potential threat of erosion created by a loss of vegetation, fallen trees, and snags. There were some suppression impacts at these sites, but these were usually rather minor.

Certainly the intensity of the fire in specific areas determined how likely a given site was to suffer any given type of impact. Figure 6.3 illustrates the frequency of effects on masonry structures by burn intensity. Burn intensity, reflected in Figure 6.3, refers to our on-the-ground determination, not the burn areas depicted on the map. As can be clearly seen in this figure, the hotter the fire, the more likely a site was to be affected by any given impact. The "stump holes in the site area" category is a curious exception, and we can offer no explanation for it at the current time.

The GIS coverage created using infrared aerial photography during the Cerro Grande Fire was used during this project and divided burn severity into three categories: low, moderate, and severe (see Figure 4.2). These distinctions were made largely on the basis of the intensity and duration of the burn within a specific area. However, in-field analysis at specific points on the landscape (i.e., cultural sites) revealed that there were discrepancies between the broadly painted pattern in the GIS and the true nature of the burn. Table 6.3 compares the GIS-assigned burn intensity with the field-assigned burn intensity for 470 of the sites in this study. Excluded from this table are six sites for which no field data are available, and three sites for which no GIS data are available. The large number of sites in the GIS category of "None" is due to two factors: first, a number of the sites visited were in staging areas for firefighting activities, and therefore not burned; second, sites near areas depicted as being burned on the GIS were visited to make sure they were not impacted by spot fires. In fact, the fire impacted 30 sites that were not depicted in burn areas on the GIS maps.

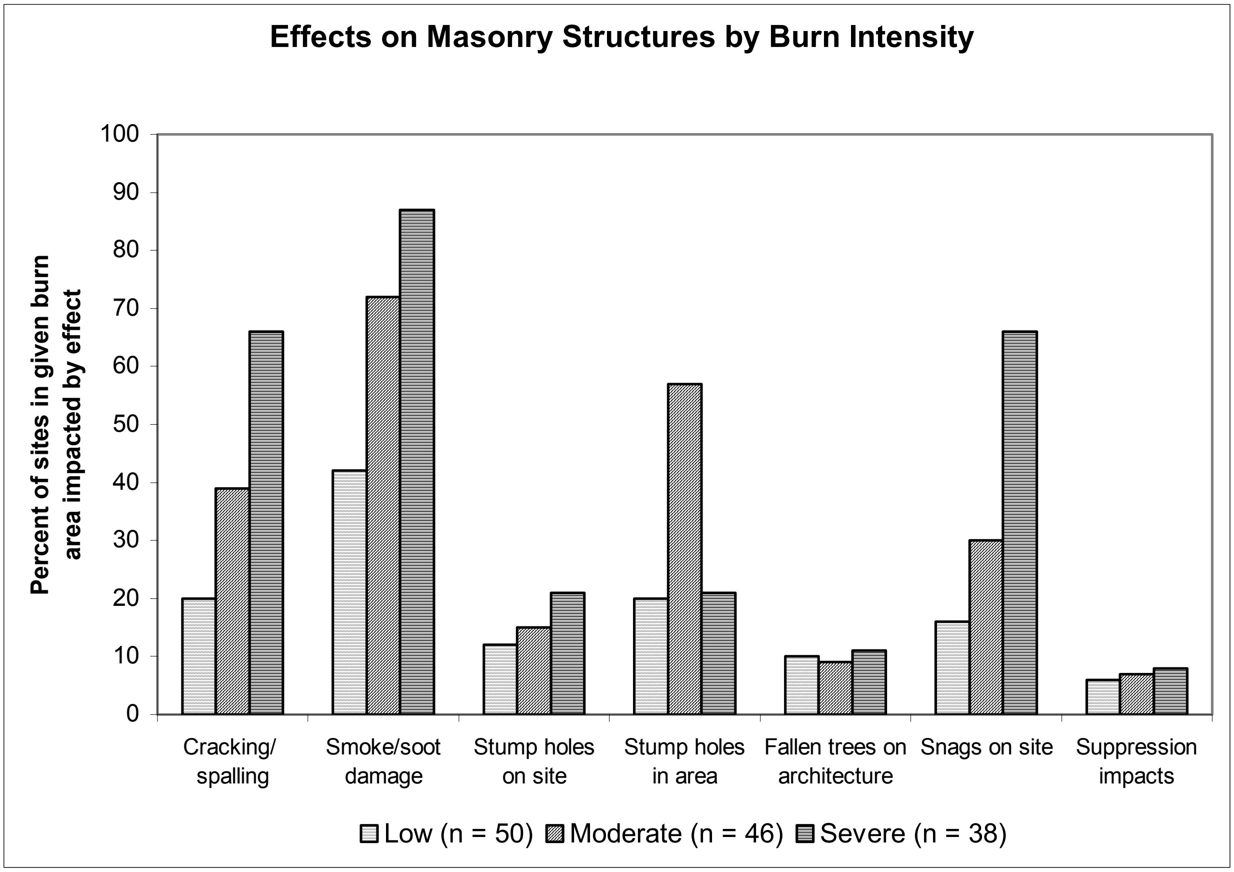

Figure 6.3. Burn intensity and fire effects to masonry structures.

The salient feature of Table 6.1 is that it shows there is a great deal a small-scale variability in burn severity within the broad GIS areas of low and moderate burn. The only GIS category that did not show this variability was severe burn. Specifically, while fewer sites overall were in burned areas (n = 278) than expected (n = 333), five times more than the expected number were in moderately or severely burned areas (n = 33 vs n = 165). Thus, while the GIS coverage gave us a good idea of *where* burning occurred, it did not give us a good idea of the *intensity* of burning at any given site.